## IN THE CLAIMS

The following listing of the claims is provided in accordance with 37 C.F.R. 1.121:

1. (currently amended) A contactless sensor device operable for sensing water vapor or a predetermined chemical vapor, the sensor device comprising:

a thin film, wherein the thin film comprises:

a sensing layer, wherein the sensing layer comprises one of a nanostructured layer and a self-assembled monomolecular layer;

a soft magnetic layer disposed directly or indirectly adjacent to the sensing layer;

wherein the thin film has a first mass, a first density, and a first magnetostrictive resonance frequency prior to the sensing layer adsorbing a predetermined amount of a predetermined vapor; and

wherein the thin film has a second mass, a second density, and a second magnetostrictive resonance frequency subsequent to the sensing layer adsorbing the predetermined amount of the predetermined vapor;

at least one microheater disposed between the sensing layer and the soft magnetic layer;

a driving coil disposed indirectly adjacent to and at a predetermined distance from the thin film, the driving coil operable for generating an alternating-current magnetic field used to query a shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency; and

a measuring coil disposed indirectly adjacent to and at a predetermined distance from the thin film, the measuring coil operable for measuring and quantifying the shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency.

2. (original) The sensor device of claim 1, wherein the thin film has an initial thickness of between about 100 nm and about 5 mm.

3. (original) The sensor device of claim 1, wherein the sensing layer comprises a plurality of nanoparticles.

4. (original) The sensor device of claim 3, wherein the plurality of nanoparticles comprise at least one of a plurality of nanorods, a plurality of nanotubes, and a plurality of nanofibers.

5. (original) The sensor device of claim 1, wherein the sensing layer comprises a material selected from the group consisting of a zeolite, a polyelectrolyte, a porous ceramic, an aluminosilicate, carbon, and a combination comprising at least one of the foregoing materials.

6. (original) The sensor device of claim 1, wherein the sensing layer has an initial thickness of between about 1 nm and about 1 mm.

7. (original) The sensor device of claim 1, wherein the soft magnetic layer comprises a material selected from the group consisting of Fe(x)Ni(y)P(z)B(n), Fe(x)Tb(y)Dy(z), Fe(x)Si(y), and a combination comprising at least one of the foregoing materials.

8. (original) The sensor device of claim 1, wherein the soft magnetic layer has an initial thickness of between about 100 nm and about 1 mm.

9. (original) The sensor device of claim 1, wherein the driving coil and the measuring coil each comprise a planar coil integrated on a silicon wafer.

10. (original) The sensor device of claim 1, wherein the driving coil and the measuring coil are each disposed at an initial distance of between about 1 cm and about 0.5 m from the thin film.

11. (original) The sensor device of claim 1, further comprising a correlation algorithm operable for correlating the measured and quantified shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency to an amount of the predetermined vapor present in an environment surrounding the sensor device.

12. (original) The sensor device of claim 1, wherein the predetermined vapor comprises one of water vapor and a predetermined chemical vapor.

13. (original) The sensor device of claim 1, further comprising an adhesion layer disposed between the sensing layer and the soft magnetic layer, wherein the adhesion layer comprises at least one of a polymer layer and a metal layer.

14. (currently amended) The sensor device of claim 1, further comprising ~~one or more microheater devices and~~ a plurality of dielectric layers disposed between the sensing layer and the soft magnetic layer, wherein the at least one ~~or more~~ microheater ~~devices~~ and the plurality of dielectric layers are arranged in a sandwich configuration.

15. (currently amended) The sensor device of claim [[14]] 1, wherein each ~~of the one or more~~ microheater ~~devices comprise~~ comprises a material selected from the group consisting of a metal thin film, a heavily-doped silicon thin film, and a silicon carbide thin film.

16. (original) The sensor device of claim 14, wherein each of the plurality of dielectric layers comprises a material selected from the group consisting of silicon nitride, silicon oxide, parylene, and polyimide.

17. (original) The sensor device of claim 1, further comprising a substrate disposed directly or indirectly adjacent to the thin film.

18. (original) The sensor device of claim 1, further comprising an antenna operable for transmitting measured data related to the shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency to an external contactless data logger.

19. (currently amended) A method for fabricating a contactless sensor device operable for sensing water vapor or a predetermined chemical vapor, the method comprising:

providing a thin film, wherein providing the thin film comprises:

providing a soft magnetic layer;

disposing a sensing layer directly or indirectly adjacent to the soft magnetic layer, wherein the sensing layer comprises one of a nanostructured layer and a self-assembled monomolecular layer;

wherein the thin film has a first mass, a first density, and a first magnetostrictive resonance frequency prior to the sensing layer adsorbing a predetermined amount of a predetermined vapor; and

wherein the thin film has a second mass, a second density, and a second magnetostrictive resonance frequency subsequent to the sensing layer adsorbing the predetermined amount of the predetermined vapor;

<u>disposing at least one microheater between the sensing layer and the soft magnetic layer;</u>

disposing a driving coil indirectly adjacent to and at a predetermined distance from the thin film, the driving coil operable for generating an alternating-current magnetic field used to query a shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency; and

disposing a measuring coil indirectly adjacent to and at a predetermined distance from the thin film, the measuring coil operable for measuring and quantifying the shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency.

20. (original) The method of claim 19, wherein the thin film has an initial thickness of between about 100 nm and about 5 mm.

21. (original) The method of claim 19, wherein the sensing layer comprises a plurality of nanoparticles.

22. (original) The method of claim 21, wherein the plurality of nanoparticles comprise at least one of a plurality of nanorods, a plurality of nanotubes, and a plurality of nanofibers.

23. (original) The method of claim 19, wherein the sensing layer comprises a material selected from the group consisting of a zeolite, a polyelectrolyte, a porous ceramic, an aluminosilicate, carbon, and a combination comprising at least one of the foregoing materials.

24. (original) The method of claim 19, wherein the sensing layer has an initial thickness of between about 1 nm and about 1 mm.

25. (original) The method of claim 19, wherein the soft magnetic layer comprises a material selected from the group consisting of Fe(x)Ni(y)P(z)B(n), Fe(x)Tb(y)Dy(z), Fe(x)Si(y), and a combination comprising at least one of the foregoing materials.

26. (original) The method of claim 19, wherein the soft magnetic layer has an initial thickness of between about 100 nm and about 1 mm.

27. (original) The method of claim 19, wherein disposing the sensing layer directly adjacent to the soft magnetic layer comprises growing the sensing layer on a surface of the soft magnetic layer.

28. (original) The method of claim 19, wherein disposing the sensing layer directly adjacent to the soft magnetic layer comprises depositing the sensing layer on a surface of the soft magnetic layer.

29. (original) The method of claim 19, wherein the driving coil and the measuring coil each comprise a planar coil integrated on a silicon wafer.

30. (original) The method of claim 19, wherein the driving coil and the measuring coil are each disposed at an initial distance of between about 1 cm and about 0.5 m from the thin film.

31. (original) The method of claim 19, further comprising providing a correlation algorithm operable for correlating the measured and quantified shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency to an amount of the predetermined vapor present in an environment surrounding the sensor device.

32. (original) The method of claim 19, wherein the predetermined vapor comprises one of water vapor and a predetermined chemical vapor.

33. (original) The method of claim 19, further comprising disposing an adhesion layer on a surface of the soft magnetic layer prior to disposing the sensing layer indirectly adjacent to the soft magnetic layer, wherein the adhesion layer comprises at least one of a polymer layer and a metal layer.

34. (currently amended) The method of claim 19, further comprising disposing ~~one or more microheater devices and~~ a plurality of dielectric layers on a surface of the soft magnetic layer prior to disposing the sensing layer indirectly adjacent to the soft magnetic layer, wherein the at least one ~~or more~~ microheater ~~devices~~ and the plurality of dielectric layers are arranged in a sandwich configuration.

35. (currently amended) The method of claim [[34]] 19, wherein each ~~of the one or more~~ microheater ~~devices comprise~~ comprises a material selected from the group consisting of a metal thin film, a heavily-doped silicon thin film, and a silicon carbide thin film.

36. (original) The method of claim 34, wherein each of the plurality of dielectric layers comprises a material selected from the group consisting of silicon nitride, silicon oxide, parylene, and polyimide.

37. (original) The method of claim 19, further comprising sputtering the thin film onto the surface of a substrate.

38. (original) The method of claim 19, further comprising providing an antenna operable for transmitting measured data related to the shift in the magnetostrictive resonance frequency of the thin film from the first magnetostrictive resonance frequency to the second magnetostrictive resonance frequency to an external contactless data logger